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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,347	03/10/2005	Derek John Fray	R & G-106	7234

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EXAMINER
SALZMAN, KOURTNEY R

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/17/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

euspto@slspatents.com

Office Action Summary	Application No.	Applicant(s)	
	10/527,347	FRAY ET AL.	
	Examiner	Art Unit	
	KOURTNEY R. SALZMAN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-21 and 29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 5-21 and 29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed June 22, 2009 has been entered and fully considered.

2. Claims 4, 27 and 28 were cancelled in the amendment, in addition to the amendment of claims 1, 14 and 21. Claim 29 has been added.

3. Claims 1-3, 5-21 and 29 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claims 1-3, 5-12 and 17-21 are rejected under 35 U.S.C. 102(a) as being anticipated by SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society)

Regarding claim 1, SCHWANDT et al teaches a hydrogen sensor for use in molten aluminum and its alloys in the abstract. The second full paragraph in the section titled “The Novel Hydrogen Analyser”, the sensor is said to have a perovskite electrolyte in conjunction with a zirconium/hydrogen mixture, operating at a temperature above 550 degrees Celsius. A seal is shown to be used in figure 1. In the second limitation of claim 1, because SCHWANDT et al discloses a fully functioning sensor (see fig. 1 and 3), the content or spatial distribution of

oxygen in SCHWANDT et al is such that the solid electrolyte is substantially chemically stable giving the claim language its broadest reasonable interpretation. With respect to the oxygen level being "predetermined", whether or not the oxygen level is known or not does not further define the apparatus unless the claim explicitly defines a level of oxygen in question. In addition, it is unclear even to what extent the oxygen content or distribution of the present invention is “predetermined” as the examiner sees no evidence that the applicant actually measured the oxygen concentration levels of its metal/hydrogen reference standard. The only thing relating to a predetermined level of oxygen was the known oxygen content of one of the starting materials (but not the other materials) prior to the firing of that material at 940 °C in a hydrogen atmosphere (page 13, lines 11-22). It is unclear how the oxygen concentration of one of the starting materials prior to a high temperature firing in a reducing gas correlates to a predetermined knowledge of the oxygen concentration of the final metal/hydrogen reference standard. Moreover, if this is the standard for what constitutes predetermined oxygen concentration, because most metal manufacturers will presumably report impurity concentrations of its metal, including the concentration of oxygen, then the oxygen content or distribution in SCHWANDT et al would also have thereby been “predetermined” by simply looking at the material data sheet for its purchased metal. Again, in the absence of a particular set forth level of oxygen that differentiates the present invention

from the prior art, the oxygen content or distribution limitations cannot define a difference over the teaching of SCHWANDT et al.

Regarding claims 2 and 3, SCHWANDT et al teaches a calcium zirconate partially substituted or doped in the second paragraph of the section “The Novel Hydrogen Analyser”.

Regarding claims 5 and 6, in the second paragraph of section “The novel Hydrogen Analyser” the two phases of β and δ zirconium will be present.

Regarding claims 7-10, when heated the calcium and calcium hydride of the reference standard will react with any oxygen present at the interface between the electrolyte and electrode, forming various oxide layers at the surface. Prevention of the reaction of the solid electrolyte and the reference is a key to the stable operation of the sensor and maintaining a known hydrogen partial pressure as addressed in the section “The Novel Hydrogen Analyser”.

Regarding claims 11 and 12, figure 1 shows a platinum coating and are described in the second paragraph of section “The Novel Hydrogen Analyser”.

Regarding claims 17 and 18, the same apparatus is created regardless of which order the steps are performed. Therefore, since these are apparatus claims, the

stable finished sensor of SCHWANDT et al fulfills these claims. Moreover, the Introduction and “The Novel Hydrogen Analyzer" sections sufficiently describe assembly.

Regarding claim 19 and 20, the first paragraph of the section titled "Measurements and Results" teaches these steps including the preconditioning or “routine check” of SCHWANDT et al.

Regarding claim 21, SCHWANDT et al teaches a hydrogen sensor for use in molten aluminum and its alloys in the abstract. The second full paragraph in the section titled “The Novel Hydrogen Analyser”, the sensor is said to have a perovskite electrolyte in conjunction with a zirconium/hydrogen mixture, operating at a temperature above 550 degrees Celsius. A seal is shown to be used in figure 1. In the second limitation of claim 1, because SCHWANDT et al discloses a fully functioning sensor (see fig. 1 and 3), the content or spatial distribution of oxygen in SCHWANDT et al is such that the solid electrolyte is substantially chemically stable giving the claim language its broadest reasonable interpretation. With respect to the oxygen level being "predetermined", whether or not the oxygen level is known or not does not further define the apparatus unless the claim explicitly defines a level of oxygen in question. In addition, it is unclear even to what extent the oxygen content or distribution of the present invention is “predetermined” as the examiner sees no evidence that the applicant

actually measured the oxygen concentration levels of its metal/hydrogen reference standard. The only thing relating to a predetermined level of oxygen was the known oxygen content of one of the starting materials (but not the other materials) prior to the firing of that material at 940 °C in a hydrogen atmosphere (page 13, lines 11-22). It is unclear how the oxygen concentration of one of the starting materials prior to a high temperature firing in a reducing gas correlates to a predetermined knowledge of the oxygen concentration of the final metal/hydrogen reference standard. Moreover, if this is the standard for what constitutes predetermined oxygen concentration, because most metal manufacturers will presumably report impurity concentrations of its metal, including the concentration of oxygen, then the oxygen content or distribution in SCHWANDT et al would also have thereby been “predetermined” by simply looking at the material data sheet for its purchased metal. Again, in the absence of a particular set forth level of oxygen that differentiates the present invention from the prior art, the oxygen content or distribution limitations cannot define a difference over the teaching of SCHWANDT et al. The application of the voltage to the sensor is discussed in the section regarding "Measurements and Results".

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson and

C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society), in view of KIODE et al (US 5,445,725).

Regarding claim 13, SCHWANDT et al doesn't teach the specific material used to create the cavity discussed for packing the counter reference electrode.

KOIDE et al discloses the use of a glass sealing material for use to keep the reference electrode sensor gas tight as disclosed in column 6, lines 53-57.

At the time of the invention, it would have been obvious to utilize the sealant of KOIDE et al for the detection sensor of SCHWANDT et al because both seek to create an air tight seal and use of the sealant of KOIDE et al in the sensor of SCHWANDT et al will cause the same predictable result of air tight sealing as in use in KOIDE et al.

8. Claims 14 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society) and KOIDE et al (US 5,445,725) as applied to claim 13 above, as evidenced by FERRO ("Electronic and Specialty Glass: Low Temperature Sealing." Ferro Corporation. 2008. 11 Apr. 2008 <http://www.ferro.com/our+products/electronic/products+and+markets/electronic+and+specialty+glass/low-temperature+sealing.htm>.)

KOIDE et al teaches the use of a glass sealant to create the air-tight sensor of SCHWANDT et al and discloses all the necessary elements of claims 1 and 13.

The combination of KOIDE et al and SCHWANDT et al does not teach the use of a specific type of glass.

There are a very large number of low temperature sealant products evidenced by the Ferro Corporation extensive list shown including product EG 2759 which is used with glass substrates like that of the sensor tubing. This sealant, as shown in the information regarding the product, functions as a glass sealant containing no silicon and borate, a boron oxide, with a low temperature. These types of sealants are very common in the industry and is just one example of those offered by one company. Regarding claim 29, it would have been obvious to one of ordinary skill in the art to select a sealant with a melting temperature lower than 1200 degrees Celsius because the current operation of the sensor is only up to 800 degrees Celsius, therefore a melting temperature higher than that is unnecessary.

At the time of invention, it would be obvious to use the sealant of the FERRO Company as a substitute for the glass sealant used in the combination of KOIDE et al and SCHWANDT et al because the simple substitution of materials which function the same way would create a predictable result.

9. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over SCHWANDT et al (C. Schwandt, D.J. Fray, M.P. Hills, M.A. Henson, R.M. Henson and C. Powell, 6th International American Foundry Society Conference, Orlando, FL, 2001. American Foundry Society) and KOIDE et al (US 5,445,725) as applied to claim 13 above, and further in view of BODE (US 4,174,258).

KOIDE et al teaches the use of a glass sealant to create the air-tight sensor of SCHWANDT et al and discloses all the necessary elements of claims 1 and 13.

The combination of KOIDE et al and SCHWANDT et al does not teach the use of a protective film, or inert packing, within the sensor.

BODE teaches an electrolyte gas sensor which uses a protective means 13. Figure 2 shows the protective means to fill the balance of the sensor. BODE teaches the protective material to contain oxide metals including that of yttrium. (c. 4, l. 4-19) BODE shows the protective member to be a liner or located inside the sensor chamber, therefore between the inside or electrode member of ALBERTI et al and the sealant disclosed on the outside of the electrode of KOIDE et al.

At the time of invention, it would be obvious to fill the sensor chamber, as disclosed in BODE, in the sensor as disclosed by SCHWANDT et al and KOIDE et al because the material is used to maintain a constant partial pressure of gas within the sensor chamber (c. 4, l. 1-3), just as is required by an effective reference electrode through constant partial pressure.

Response to Arguments

10. Applicant's arguments with respect to claims 1 and 21 have been considered but are moot in view of the new ground(s) of rejection.

11. New grounds of rejection, mostly the use of SCHWANDT et al, have been applied in light of the amendment to the claims requiring an oxide-based proton-conducting solid electrolyte and the new scope based on amendment.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KOURTNEY R. SALZMAN whose telephone number is (571)270-5117. The examiner can normally be reached on Monday to Thursday 6:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

krs
11/5/2009